174 /250/ introduced before or after the Christian era, it is nonetheless true that the ancestors of the Tuareg must have introduced it.

182 At the present time, human life in the Sahara, which is already of little consequence, would be reduced to zero without
233 the camel. This is a fundamental fact which has been amply demonstrated and which it is useless to dwell on. Th. Monod, who dedicated one of his works "To the camel and the goat, the vehicle and the container, the two sole conquerors of the Sahara, " (1)

1. Méharées/ Meharis/.

has not only been literary and witty, he has put the truth in a few words. Without the camel, no relation would be possible between the oases, no relation between North Africa and intertropical Africa.

233 One may therefore easily understand that the animal plays a large part in the life of the Saharian Tuareg, and that the latter make a great effort to raise camels. They have always endeavored to own many camels, and at the present time their livestock has increased to more than 10, 000 head.

[132] Although the camel has adapted perfectly to the Saharian
[492] pastures and terrain, it is nonetheless true that the aridity is such that he has difficulty keeping in good condition, and that a slightly prolonged march has to be compensated for by a rest period lasting twice as long as the period during which he was tired out. That is
[361] why the Ihăggaren nomadize with their camels on the borders of the Sahara in the steppe where there are acacias and graminaceae.

232 Ahaggar breeding is very famous. It furnishes animals which are resistant, very frugal eaters, capable of braving mountain rocks or marching for weeks on end over the granite regoliths of the Tanezrouft, something the Sudanese -bred camels could not do.

The Tuareg select the animals when they are very young, destining them either for saddle camels or for pack camels. The meharis are castrated and undergo special training. In speaking of

232 these saddle camels, one may not, therefore, refer to a particular breed /race/ adapted for speed, as one may commonly hear spoken of.

436 The camel has a well determined exchange value among the Tuareg. It is one of the bases for comparison in their commercial transactions.

233 422 Each tribe marks his animals with a particular sign, and /251/ the owners who have many camels also have their own signs, marked with a hot iron on one of the parts of the animal's body -- neck, cheek, or thigh.

233 [137] The sheep. -- Sheep are raised only accessorily in the Ahaggar, because grass is not abundant enough. But it occupies a large place in Sudanese animal husbandry.

[136] [174] It is a very peculiar animal with short hair and a long tail. It stands tall, a characteristic which has won for it the name of Ovis longipes. The Tuareg certainly introduced it into West Africa. Zoologists never refer to it except as Tuareg sheep. Its antiquity in North Africa is well known. The ram of Ammon is pictured with its characteristic form, and it is also recognizable in the splendid rock drawings of Géryville and Tlout. It seems to descend from the Corsican wild sheep rather than from the Algerian wild sheep. Today it is an animal found exclusively in Tuareg camps of the Sudan or in their area of influence.

574 262 237 Sheep is the dish served at great feasts, and its skin is used as a ground rug, a blanket, or to make harnessing articles.

233 The goat. -- The goat is the mountain animal par excellence, as frugal an eater as can be, resisting both cold and heat, and able to be content with the meagerest pastures. It is thus quite natural to find many of these goats among the Ihaggaren.

[136] [235] /252/ The Ahaggar species is small with long black hair. In the Sudan it is different colors -- white and black, or red -- with short hair; it stands taller than the Ahaggar species and is often crossed with the dwarf female goat in the southern tribes.

136 The origin of the goat is less certain than that of the sheep. Very widespread all over the world, it must have been domesticated at

136 several different spots, and it is not impossible that the species
[172] bred today in the Ahaggar is of African origin. Bones of the species are found in the Neolithic layers of the Sahara.

137 At the present time there is a death struggle between the goats
233 and trees in the Ahaggar. The goat itself is capable of browsing
185 the lower branches and destroying them, thanks to its agility. The Tuareg do the rest when pasture is scarce, by felling the main branches to put them within the reach of the animals. And so, in a relatively short time, trees, and the tahla (Acacia sp.) in par-particular, will be only a memory in the Ahaggar. Nothing has

[412 326 172]

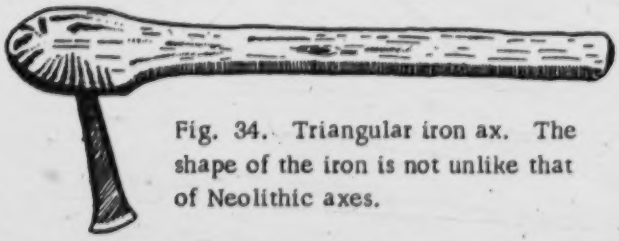

Fig. 34. Triangular iron ax. The shape of the iron is not unlike that of Neolithic axes.

been done by the French administration in the Ahaggar to protect the trees, when it would be sufficient to close some valleys for several years, while taking into account the needs of the shepherds. Measures of this kind have been taken in the environs of Goundam and have given very good results.

132 Prolonged dryness which causes a lack of pasture often puts
233 goat raising in difficulties. The birth rate is stopped short, and mortality may result to such a great extent that the number of animals sometimes falls to one fifth. Then many years are needed to build up the flocks, granting, of course, the arrival of favorable rains.

• 232 The careless and fatalistic Ihaggaren do not even try to step up breeding by buying sires in Adrar or in Aïr. They let their weak flocks reconstitute themselves by their own means, which [272] sometimes requires many years. In case of an overabundance of births, they limit the number of animals, for they are well aware

of the average resources of their country and never let their flocks exceed the number of head necessary for the milk needs of their family -- about ten to twelve animals per person. The surplus is consumed or sold to the sedentary people in the agricultural centers.

/253/ The Ahaggar goats give very rich milk which makes excellent butter. The meat, which is a little tough, is eaten boiled, and the hide is valued for making saddle bags, waterskins, and sometimes tents.

The ass. -- The Ahaggar Tuareg have many asses. They do not breed them properly speaking, taking no care of them and letting them reproduce freely. Many Tuareg do not know the exact number of asses they have, for they do not use them all and abandon them in the mountains where they become more or less wild. The young ones, born in the meantime, do not let anyone get near them, and they must be trapped and then trained in order to be used.

These asses running loose, called haoulil by the Ahaggar Tuareg, have given rise to a legend of wild asses. On this subject, Gautier cited the adventure of General Laperrine who had a "wild" ass hunted by his Arab horsemen, only to notice later that the animal had been castrated.

Although there are no more wild asses in the Ahaggar, it is nearly certain that there were some. They were pictured in the rock drawings of the Djorat wadi, and some still exist in Abyssinia where they are called "onager."

The ass is very much at home in the Ahaggar. It is possible that it was domesticated there. The legends of the Ihaggaren have kept the memory of the first inhabitants, the Issebeten, who had only asses and goats.

In their short moves the Tuareg utilize asses to transport baggage, and men and women also use them as mounts. The servants also take asses to replenish the water supply, making them carry the heavy waterskins on their backs or under their bellies.

565 this by peaceful means, at least again in theory.
642 Ancient Egyptian records tell of a Libyan chieftain, Meryey who was peacefully deposed and replaced by a younger brother following a disastrous defeat in battle (Bates, 1914, pp. 114–15, 218 and 221). It is some of the vassal clans that are the biggest numerically and also the richest on a *per capita* basis; and if vassal clansmen pay tribute to their noble "masters" it is only because they choose to do so, because they find it in their interest to keep the nobles on their payroll so to speak. Thus the Tuareg government of the Ahaggar is in fact a kind of republic and not a real monarchy or true military aristocratic autocracy at all.

232 **Livestock.** Herds of camels and flocks of hairy sheep and goats constitute the bulk of the capital investment and so form the primary basis of Tuareg economy in the Ahaggar. The quantity and composition of the total livestock investment has been variously estimated, but the following rough approximations are probably not far from the true figures: camels—12,000, sheep—2,000, goats—20,000, donkeys—5,000 and cattle (zebus)—300 or thereabouts.
[231] Donkeys, as we have seen, are unproductive except as beasts of burden, and the cattle are so few as to be of negligible importance. Only some 4,500 camels are actually kept in the Ahaggar while the rest are put out to pasture in the Tamesna region on the northern edge of the Sudan, roughly half way between the Aïr and the Niger Bend. Most of the sheep too are pastured outside the Ahaggar proper, mainly in the country around Tin Zaouaten, southwest of the Ahaggar and northwest of the Tamesna.

235 The Haratin of the Ahaggar keep chickens,
262 but only the eggs are eaten as a rule. The Tuareg eat neither eggs, fowl nor fish, but we will discuss this further in the section on *Nomad Diet* in the following chapter.

●232 It has been said that the Tuareg have no special breed of riding camels but that likely looking animals are picked out early and given special training for use as mounts. The fact remains, however, that the young of famous stud camels are always the preferred choice, and these animals are specially marked shortly after birth. The method of marking consists of pinching up three small folds of skin in a row, about 2 to 3 inches apart, along

232 the ridge of the nose, and then tying a very thin leather thong very tightly around the base of each fold much as a string is tied around the opening of a toy balloon to keep the air in. After a while the thongs are cut away and three little round knobs, about the size of the end of your index finger, remain for the rest of the camel's life as a kind of hallmark of outstanding quality (fig. 26, *a*). Riding camels are very carefully and patiently trained from the age of about 2 years on, and the males are castrated when about 5 years old.

439 Trading. We have now seen that pastoralism is the central column and garden rent a corner post of Tuareg economy in the Ahaggar. Trade is the second corner post, and salt is, as we have seen, the chief article of export. [317] In April or May some of the Ahaggar Tuareg send their slaves to the salt mines of the Amadror for two or three weeks. In July they go south with their cargoes of salt, through the [487] rich pastures of the Tamesna region where they rest their animals for a while or exchange them for fresh ones, and then on to the commercial centers of the country just north of the Nigerian frontier. Here trading begins in earnest, late in October as a rule, and endless discussions and bargaining go on for a couple of months or so. Salt, and also camels, donkeys, and dates obtained from the North, are exchanged chiefly for millet but also for a variety of manufactured articles such as cotton cloth and clothing, leather goods, sandals, saddles and bridles, wooden household utensils and tools and weapons of iron and steel. In January the Ahaggar Tuareg turn north again, pause once more for a while in the Tamesna, and finally reach their homes in March or early April.

Camels, hairy sheep, goats, donkeys and congealed melted butter used to be traded in the oases of the Tidikelt and the Touat mainly for dates, and also for cotton cloth, thin woolen blankets from the Gourara, tea, sugar and tobacco. Caravans engaged in this trade used to leave the Ahaggar in January or early February and return in April. Over the last 30 years or so, however, this commercial current has been reduced to a mere trickle by middlemen with trucks who have gradually taken over delivery of the goods that caravans used to fetch from the North. The trade still exists in a sense, but it has become indirect

233/82 cont. / testicle sac; a large head is a favorable sign, as is a white coat.

The Tuareg keep one male for 30 or 40 females; all the [232] other males are castrated: "ennedi." The castration is done rather late in order not to interfere with the development of the animal, which will always be used as a mount or as a pack animal.

The sires having been chosen, the breeding takes place without control by man. The male pursues the female and obliges her to squat down, either by putting his neck on hers or by biting her foot. Females in heat sometimes solicit the male. The covering is made after the female has been brought to squat with the male behind her; his hind legs are completely folded, his pectoral callus rests on the female's back, and his front legs are placed along her breast to keep her prisoner. The covering lasts, it seems, half an hour; after two hours, the male can begin another covering. When all the females of the herd are impregnated, the sire grazes and rests for nearly three months.

The female camel carries her young for 12 months, sometimes 11; she bears one young camel (the Tuareg questioned have never seen twin camels born). A good milk camel gives six liters at each milking, but she is only half milked, the rest being saved for the baby camel, which begins to eat only at the age of about three months.

When the female camel goes to graze during the day, followed by her colt, she wears an "abedjo" over the udder so the young camel cannot suck. The abedjo is a sort of coarse net attached to the loins and exactly covering the udder (it is made with cord from fibers of tahla branches: "ikakaben," extremely strong and rough, which repulses the young camel).

Goats constitute a veritable fortune for the /83/ Tuareg. They are content with the meager pastures of the dry years; they graze near the tents, to which they return each night to sleep. They are seen everywhere in the Ahaggar, even in the places that at first sight seem the most bleak.

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25



yield decreases to about two litres (Doutressoulle 1947, p. 104). It should be added that, as for other domestic animals, the daily yield of milk depends very much on the conditions of pastures, and cows always yield little milk when pastures are dry – even at the beginning of their lactation period.

Bulls are frequently castrated two or three years old to be used for riding and transportation. Oxen are used for this purpose particularly among the Tuareg of the plains towards the south and west, while most pastoralists of the Massif almost exclusively use donkeys and camels. Oxen are ridden without a saddle. The rider sits on the back of the animal which is covered with a blanket or a piece of cotton as in Ahaggar. The animals have a cord (*asabar*) placed through their nostrils, but plaited halters (*amerar*) are also used for riding oxen.

The Tuareg have terms to cover the age and sex of their cattle, and they also have a certain number of colour terms; but they say that there are very few colour terms for cattle (about ten terms according to Tuareg of the *Kel Ferwan* group). They explain this lack of colour terms by the fact that cattle did not play any important rôle to their subsistence in the past. Cattle do not respond to their names, but some of them will come to the camp on the utterance of a certain cry (cf. p. 135).

Fig. 31. Zebu calf with a pronged stick (*tabellut*) put through its nostrils to prevent sucking. Ayr, the *Isakaranan* tribe.
Fig. 32. Muzzle (*akimbab*) to wean zebu calves. The muzzle is made of boughs of the *tamat* acacia (*Acacia flava*) which form a frame covered with cords of *tamat* bast and with cotton strips. It is fastened to the head of a calf with a piece of cord plaited of goat's hair, and the attachment is done in such a way that the calf can graze without difficulty though it cannot suck. Tamesna, Ahaggar Tuareg of the *Iregenaten* tribe. Dimension: 0.17–0.19 m high. (N. M. G. 6661).

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25



685 648 One of the principal tasks of the Ayr camel patrol consists in hunting down camel thieves to take them to Agadez and prove their guilt. Most Tuareg sympathize with this judicial work of the French but claim that it is too ineffective.

232 * 492 [435] The Tuareg still take a very great interest in the breeding of riding camels, and extremely good riding animals are occasionally sold for a price equal to that paid for five or six normal camels. When a calf is born they at once recognize whether it will be well fitted for riding or not, for there are certain basic characteristics of riding camels. Ideally they should have a relatively short body, be deep-chested, and of high stature with small feet and slender limbs. For pack-camels they prefer heavy and strong animals with very large feet. Both for riding and for transportation they prefer bulls or castrated animals. Geldings are calmer than bull-camels which are often very fierce and dangerous when she-camels are on heat. Rutting bull-camels may even attack people, and they will fight each other – sometimes with the result that one of them is bitten to death. But there is another reason for castration. For bull-camels which have not been allowed to mate freely with she-camels are generally not very difficult to handle. Castration makes bull-camels stronger and more enduring as they more easily grow fat and get larger humps than non-castrated animals. Castration is never carried out until the bull-camel is fully grown, and both in Ahaggar and in Ayr castration is performed comparatively late when the animals are about five or six years old, or later. Many bull-camels are castrated at an age of ten or eleven years.

* 233 * 492 She-camels are not generally used for riding and transportation, but are reserved for breeding. But some Tuareg may use their she-camels even for extensive trading expeditions, and there are Tuareg who prefer to ride she-camels because of their smoother walk. If a Tuareg has a very good she-camel as a riding animal he may even desire to prevent it from mating by the insertion of a very small pebble into the uterus of the she-camel which will then not be able to mate until the pebble is removed. However,

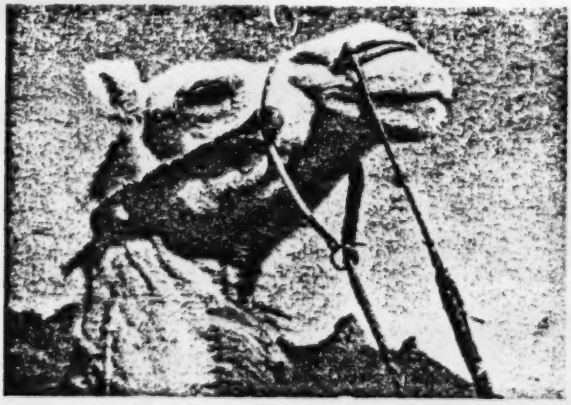

Fig. 50. The headgear known as *akeskabbu*. The upper iron shackle resting upon the bridge of the nose is called *akeskabbu*, the lower shackle to be tightened against the chin is known as *amadel*. The two shackles are connected with a rein of ornamented leather, the other end of which is fastened to the nostril ring (*tiǧemt*). Ahaggar, the *Ikkn-en-tawsit* tribe.

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# Rationality and Beliefs in Stock-Breeding

Literature on so-called primitive pastoralists often states that these peoples are irrational stock-breeders. It is said that they attach an enormous value to big flocks and herds which overgraze and deteriorate pastures, that they take too little interest in selective breeding with the result that they do not castrate their superfluous male animals or perform this operation too late, and that they take an overwhelmingly large interest in the aesthetic qualities of their animals.

Tuareg stock-breeding is essentially rational and is well adopted to environment. This viewpoint can be proved by reference to the description of stock-breeding given in the preceding chapter. I have here described in some detail the system used in the mating of sheep and goats, and how mating is regulated in accordance with the development of pastures. From this description of mating regulations it also appears that the Tuareg are not only interested in having large flocks. They also want flocks of healthy and strong animals, and they generally kill or sell domestic animals before they grow barren. It should be added that the Tuareg very well know that there is a limit to the number of animals (goats and sheep), which can be herded in one and the same place. The Tuareg certainly want to be rich and to possess large flocks and herds, but they are also aware that there is a limit to size. Regarding Tuareg interest in the aesthetic qualities of their animals, I have mentioned that it is mainly focused on camels, and I have described in some detail the value attached to colours. It is clear, however, that the Tuareg interest in their animals is not confined to the aesthetic. The true value of any domestic animal is always judged rationally, and takes into consideration such qualities as age, build, stature, and the like. The Tuareg also know that qualities of domestic animals are inherited and are aware that it is necessary to have good breeding animals. Cauvet states that pastoral Tuareg attach very little importance to the quality of she-camels used in breeding, while greatly interested in the build and stature of bull-camels. In this, he says, the Tuareg differ from Arab pastoralists, who think that camel calves inherit their qualities mainly from the mother-camels (Cauvet 1925–26, I, p. 348). This statement, I believe, is not quite correctly expressed, for the Tuareg I have asked about this have stated that a camel-calf inherits qualities from both parents and they have also stressed the necessity of having good she-camels to produce the best possible calves. But most Tuareg have so few camels that they are forced to mate all their she-camels. They cannot afford to select certain she-camels for breeding, while it is easy for them to select one or two good bull-camels. All Tuareg I have asked admitted the great value of selective breeding, and said that superfluous rams and he-goats should be castrated or

7:Nicolaisen E-5 (1951-1962) 1963 MS25 Tuareg MS25



232 [1/4] killed. This does not agree with Nicolas' statement that selective breeding is unknown among the *Iwllemmeden Kel Dennek* for all types of domestic animals (cf. Nicolas 1950a, p. 133).

Superfluous bull-camels are generally castrated very late – rarely before they are six or seven years old, and frequently much later. But this is not to say that all bull-camels are used in breeding, as those used for riding and transportation are generally hobled during grazing and copulation is thus effectively prevented. Bull-camels used in breeding are not always used for riding and pack animals, as they may be very savage and dangerous. In the rutting season they are left unhobled among the she-camels.

The Tuareg consider it best to castrate bull-camels late, and say that bull-camels if castrated at a very early age will not develop fully, or become such good riding and pack animals. Bull-camels which have not been allowed to mate are not so difficult to control during the periods when she-camels are on heat. Nevertheless, when bull-camels are castrated they become more docile. But to the Tuareg it is more important that gelded animals easily grow fat and thus acquire the strengh and endurance to enable them to perform the long and arduous expeditions connected with caravan trading and, in the past, also with raiding. In brief, castration of bull-camels is done as follows:— The legs of the animal to be operated are tied tightly with strong cords, and it is kept firmly to the ground by the weight of people sitting upon it. The operator thereupon cuts two slices in the animals scrotum and pulls out the testicles together with the spermatic cords. This must be done with great care because, it is said, the animal may die if one of the spermatic cords breaks. This method of castration by extraction is the only method used foı camels, and it may also be applied to other domestic animals such as bulls, rams, he-goats, and in Ahaggar also to donkey stallions. In the north this extraction method is known as *aselbi* while the *Kel Ferwan* Tuareg of Ayr use the word *azam*. The latter people claim that castration by means of cutting and extraction should be performed in spring (*tabsit*) or during the early rains (*akasa*), as the wounds will heal properly at these seasons. The other important castration method used among the Tuareg is that of chrushing the spermatic cords, it is known to the Ayr Tuareg as *éddaz*, and is never used for camels but is frequently applied to he-goats, rams, and bulls. Chrushing of the spermatic cords is done by means of stones or pieces of wood – frequently by beating with the heavy wooden pestle of the large millet mortar (cf. Fig. 177). I believe that this method is that most commonly applied to he-goats and rams, and Tuareg of Ayr claim that they can use this method all the year round as it leaves no wounds to be healed. Rams and he-goats may be castrated at any age and even very old animals are castrated to make them fat for slaughtering. It is claimed that it is best to castrate superfluous lambs and kids very early, preferably as soon as they are weaned.

[4/2]

I believe that the examples given above confirm my statement that the Tuareg are mainly rationalists in their stock-breeding methods. To elucidate this in more detail I shall now present my material on Tuareg veterinary knowledge. This material is unfortunately not very precise because the Tuareg distinguish between very many stock-diseases, and the treatments applied can be studied scientifically only by a veterinary surgeon. A description of stock-diseases is available for the northern parts of the Sahara ("Notice sur l'Institut Pasteur d'Algérie", I–II, 1934–1949), but there seems to be no particular study of Tuareg stock-diseases, which I know only by their Tuareg names. As I have not studied this rather special subject in great detail, I supplement my own material with informations gathered from literature.

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[1/4]

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The most dangerous African cattle disease is the rinderpest. It is known to have entered Egypt in the year 1884 from the regions around the Black Sea, and about 1890, or somewhat later, it came to Eastern Africa and to the Sudan. Rinderpest is nowadays widely found in Africa but it is rare or unknown in Northern Tuareg countries. Rinderpest is apparently very rare in the Ayr Massif and it occurs mainly south of the Massif in savannah country. The Tuareg have no remedy against this disease. It is stated by St. Croix that the Fulani of Northern Nigeria once deliberately exposed their cattle to mild rinderpest to make them immune from this disease in its more severe and dangerous form. However, this method did not work and the Fulani gave up further experiments of this kind. It is also mentioned by St. Croix that the Fulani practise a kind of vaccination against cattle pleuro-pneumonia and that this is done as follows:— A piece of infected lung is put into milk for two to three days and thereupon placed into a small opening cut under the nose-skin of the animal. The method is claimed to be effective (St. Croix 1944, p. 24 f.). Vaccination methods are also known to some of the Southern Tuareg, e.g. the *Iwillemmeden*. These people vaccinate human beings against small-pox by inserting the pus of this disease into wounds cut with a knife (Aymard 1911, p. 108), and they also vaccinate their cattle against cattle pleuro-pneumonia ("peripneumonie bovine"). They do this in much the same way as described above for the Fulani:— An infected piece of lung is placed in sour milk or in the soil for a few days, and is thereupon inserted under the skin of the forehead. Nicolas describes the method as dangerous because the infection attacks the whole forehead and also the nose-bone (Nicolas 1950a, p. 133), but two veterinary surgeons who practised among the *Iwillemmeden* of Tawa told me that they considered this kind of vaccination effective. The method is unknown among the Ayr Tuareg of the Massif where this contagious lung-disease is unknown or very rare.

I have no great knowledge of the contagious diseases in the Tuareg groups I have studied, but such diseases seem to occur comparatively rarely, and there is no veterinary surgeon attached to the French administration of Northern Tuareg countries. There is one veterinary surgeon in Agadez, but his most important field of work lies outside of the mountain massif to the south.

Among the *Kel Ferwan* Tuareg of Southern Ayr I have been told about two contagious diseases which, when they occur, may give rise to very heavy losses. One of these diseases is known to the Tuareg as *chanqa*. It attacks only cows, which die very quickly, but if cattle suffering from the disease are ritually killed their meat is nevertheless considered edible. One Tuareg told me that some years ago about thirty cattle of his camp died in one day from an attack of *chanqa*.

The other contagious disease I have recorded from Southern Ayr is called *tandert*. It attacks sheep and goats, and I collected the following notes about it:— The blood penetrates the animal's flesh which becomes quite red. If sheep or goats suffer from *tandert* and are ritually killed for eating, very great care must be taken in the preparation of the meat. It must be boiled until it contains no blood, and must not be eaten until it is cold and dry. It is said that if these precautions are not taken the people who eat meat from animals suffering from *tandert* will themselves become attacked by the disease, with the result that blood and pus may penetrate the skin at any part of the body. They say that a man who has eaten unboiled meat of an animal suffering from this disease with consequent infection is treated in the following way:— A species of ant more venomous than the normal small

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ants is collected and put into the millet mortar and pounded. The pounded mass of ants is then placed on the affected individual at the spot where blood and pus have penetrated the skin. The disease is characterized as very dangerous for human beings as blood and pus may emerge at any place of the body, and can, for instance, destroy an eye. The Ayr Tuareg say that they have no remedy against *tandert* when it affects their sheep and goats. The disease *tandert* can hardly be anything but anthrax. According to information from the veterinary surgeon Niels Grunnet much indicates that the contagious disease *changa* is also anthrax.

Foucauld has recorded a few contagious stock-diseases from Ahaggar:— *tarut*, a lung disease affecting cattle, goats, and camels. The lungs are filled with pus, and the animals die in four to ten days. *teharet*, a disease attacking sheep and goats which will die with yellow entrails. *weñhet*, a contagious disease attacking jackals, dogs and related animals which will die quickly. It is not the true rabies. *talekmet*, apparently a kind of scrofula which affects the udders of female domestic animals. These do not necessarily die from the disease but their udders may wither (Foucauld 1951–52, IV, p. 1558, 1663, III, p. 1509, 1044). Dr. Grunnet has informed me that *tarut* could be the pulmonary form of *pasteurellosis* also called *haemorrhagic septicaemia*, while *weñhet* may very well be distemper. The *talekmet* disease according to Dr. Grunnet is not easy to identify by the present information, but three conditions are possible:— 1) cow pox, 2) *actinomycosis* of the udder, and 3) *mastitis*. The Ahaggar Tuareg, like the Ayr Tuareg, do not seem to have any remedies against such contagious diseases which incidentally are rare. But there are many other stock-diseases and treatments for them.

The Ayr Tuareg have mentioned to me about thirty different names of camel diseases. The description of these diseases was frequently difficult to understand, and I noted only the following names:—

***azni***, that is a disease of congestion due to heat-apoplexy which is cured by bleeding with a knife or with tobacco powder put into the camel's eyes.

***tadanak***, an eye disease cured by cutting around the eyes and by the insertion of salt.

***ichilchal***, a nose disease cured in the following way:— The handle of a wooden spoon is put up through the nostril to pierce the septum, and heated butter is poured into the animal's nose.

***inefdan***, a diseases which gives the camel a swollen and inflamed head. A cure is effected by cutting with a knife and by burning.

***tozu***, a kind of chill which causes pregnant she-camels to miscarry. There is no good remedy for it, but it is normal practice to pour water over the affected animal.

***lejwad***, a paralysis of the hind thighs of camels. The affected animals cannot stand up. The only remedy is a very difficult operation:— A vein is opened in the hind thigs to let out a great quantity of blood. Bleeding is stopped again by sewing together the cuts, which are finally treated with fire.

***tibayak***, a disease which prevents the pregnancy of mated she-camels. The remedy for this consists in cutting slices around the vagina and under the tail so that blood flows. After this operation, which I have frequently attended, it is said that she-camels will become pregnant when mated.

***sanes***, a disease which prevents the pregnancy of she-camels. It is treated by putting the hand and the arm deeply into the anus of the camel. I have seen it performed once, and in this particular case the she-camel became pregnant shortly afterwards. According to Dr. Grunnet this disease is very probably *corpus luteum* which is squeezed out of the ovary by the manipulation.

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A chest disease for which the Ayr Tuareg have no particular name. It is cured by cutting two rows of small slices through the animal's skin at both sides of the fore thighs so that blood flows.

*awaras*, that is swelling of the foot caused by an acacia-thorn or other pointed object. The remedy is to remove the thorn by means of knife and awl and then burn the upper side of the foot with a red-hot iron.

*tafadé*, that is wounds on the camel's back caused by galling of the saddle and the loads. Very many camels have such wounds which are treated by pressing out the pus, by cutting, and by burning.

*ajawad*, that is scabies (*Sarcoptes scabiei* var. *Camelli*) which is extremely common. The Tuareg living around Agadez treat it in two distinct ways:— (1) an animal bone is crushed in a large mortar and the pounded mass is put into a cooking pot to be heated over the fire. A black liquid with a consistency like that of liquid butter comes out of the bone-substance after heating. It is rubbed into the skin of the infected animal. (2) Fruit of the *aborak* tree (*Balanites aegyptiaca*) are put into a cooking pot to be heated over the fire. A black liquid comes out of the fruits after heating. This is rubbed into the skin.

Camels in Africa are considered to suffer from only three major infectious diseases (*anthrax*, *pasteurellosis*, *trypanosomiasis*), but several types of local infections can be met with.

I believe that camel diseases of Ayr and Ahaggar are not very different, but I have not collected much material on the subject in the north. I give a few additional examples from Ahaggar: *adder*, that is a bunion close to the junction of leg and body of camels. The bunion is produced by rubbing of the fore thigh against the chest during walking, and some camels suffer from such bunions during long journeys. I do not know if there is any treatment for it. *ǧelek*, that is the swelling of camels which have drunk too much water after the consumption of salty plants; this swelling disappears by itself. *irelenṛwahen*, a nose disease which attack camels and goats. The nostrils are filled with pus so that the animals have difficulty in breathing. The treatment is burning. *ameṛwas*, swelling of the feet which are washed with hot water. *toẓa*, a chest disease considered contagious. The animals lose their appetite. The remedy is burning. Dr. Grunnet thinks that it could be an oedematous form of *pasteurellosis* (*haemorrhagic septicaemia*). – For scabies the Ahaggar Tuareg seem to know several treatments. They use pounded leaves of *ahoyyaṛ* (*Cleome arabica*) and of *telulut* (*Capparis spinosa*) added to sour milk and rubbed into the camel's skin. According to Maire, who has made use of information from Voinot, there are other treatments for scabies, namely the use of ashes of the *aferegak* plant (*Chrozophora Brocchiana*), tar extracted from the *azawa* tree (*Tamarix gallica* ssp. *nilotica*), charcoal of *turha* (*Calotropis procera*) which is pounded and mixed with butter, seeds of *teǧellet* (*Colocynthis vulgaris*) which are boiled into a black oil called *akaha* (cf. Maire 1933, p. 145, 156, 172, 200). Congestion due to heat-apoplexy (*ahni*) is cured as mentioned in the case of the Ayr Tuareg.

From the above description of camel diseases and their treatment it will be seen that the Tuareg know several types of veterinary methods. In brief the veterinary techniques can be summarized under the following five items:—

(1) Treatment by the hand, e.g., *Corpus luteum* which is squeezed out of the ovary by the manipulation (cf. *sanes*, p. 120), and massage treatments which the Tuareg practise with human beings and with domestic animals.

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Fig. 92. Wooden splints (*tafasast*, pl. *tifesasin*) applied to broken legs of sheep and goats by means of a long thin cord of goat's hair. Ahaggar, the *Dag Rali* tribe. Dimensions of wooden splints: about 0.12 m. (F.M. 282).

232 (2) Operation with a knife. Such operations are often very simple. Thus I have once seen sheep with swollen throats and ears which were scratched with a knife to let out some water-like pus, but I do not know the name of this disease. The knife is used for many different operations some of which have been mentioned above. It is also used for bleeding which plays a great part in Tuareg veterinary practise. Bleeding is applied to humans and to domestic animals as a treatment for various diseases. The Tuareg may bleed individuals and animals bitten by snakes or stung by scorpions, but bleeding is used for many different diseases, as the Tuareg believe that these can be removed away with bad blood which is considered their cause. Bleeding is practised with camels. Thus in summer camels are frequently bled because they get slow and tired owing to *azni* (*ahni*), that is congestion due to heat-apoplexy, and a she-camel will normally be bled two or three hours after it has brought forth a calf. I frequently attended the bleeding of camels among the Ayr Tuareg where the method is as follows:— The camel is forced to stand upright while its head is turned downwards by a man (or a woman) who grasps the head firmly at the upper lip with one hand and pulls at a rope fixed to the animal's lower jaw with the other. A rope is tied around the camel's neck close to its chest so that the neck vein can contain as much blood as possible. The neck vein in this way will swell with blood particularly close to the animal's head at a place known to the Tuareg as *abayor*. A slice about two centimetres long is cut in this place with a small sharp knife, and immediately blood will flow from the neck vein in a thin but powerful squirt. Shortly after bleeding has started the rope tied around the animal's neck is loosened, but blood is allowed to flow for several minutes, and I believe that at least two or three litres of blood is tapped. When the operation is to end the animal's head is raised, the skin around the wound is pressed together with two fingers, and bleeding immediately ceases. Once blood has started to flow from the camel it does not protest at the operation which is illustrated by the photograph Fig. 93. When a camel has been bled it will normally rest for a few hours before it starts eating again. When Tuareg get lost in the desert and lack water, they bleed their camels and

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When Tuareg get lost in the desert and lack water, they bleed their camels and drink the blood (cf. p. 235). In situations of great distress they may also kill their camels in order to obtain the water supply conserved in the animal's stomach.

(3) Treatment by burning. Wounds are cauterized by means of a redhot iron known as *tamaḳ* (Ayr), or *taterkemt* (Ahaggar). Burning with a redhot iron is also practised for camels with swollen feet as already described (p. 121). It is also common to burn a line around wounds or other sites of disease in order that it shall not spread, and burning is even practised for internal diseases, as is the case with the *toza*-disease of camels (p. 121). Redhot irons are, on the whole, used particularly for camels. Wounds of sheep and goats, e.g., wounds from jackal bites, are cauterized by means of glowing camel dung. Certain stomach diseases, such as types of tympanites, are cured by a bunch of flaming grass swept under the animal's belly. I have seen this practised with donkeys which, like horses, may suffer from a kind of tympanites known in Ahaggar as *tahagd*.

(4) Instruments and bandages. Enema should be mentioned under this heading. It is known in Ahaggar as *sebegiwen*, and is applied to humans and to animals by means of a funnel or by a special apparatus made from a piece of hollow cane connected with a skin-bag. I never had the opportunity to see this apparatus, which is depicted by Lhote who also gives some information about the use of enemas with human beings (Lhote 1955a, p. 303, Fig. 36). He mentions that an enema is also given by a mother to her little children by blowing water into the anus with her mouth. I have seen this done to children in Ahaggar, but I do not know whether this method is practised with animals also. Both in Ahaggar and in Ayr the Tuareg apply wooden splints to their domestic animals with broken legs. I have seen this device only in Ahaggar where wooden splints are known as *tifesasin* (sing. *tafasast*). They are used for sheep and goats (Fig. 92), and, by the sedentary agriculturists, also for cows. The wooden splints applied to goats are sometimes replaced by a leather bandage solidly tied around the broken leg. I mention under this heading that camels bred and born in stony or mountainous countries cannot always stand the long journeys through plain and sandy deserts. Their feet suffer

Fig. 93. Tuareg bleeding a camel at the place of the neck vein known as *abayor*. Ayr, the *Imezzureg* tribe.

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Fig. 94. Tuareg operating a camel's foreleg with a knife. Northern Ayr, the *Kel Tédalé*.

492 from the constant friction against the sand, and it may become necessary to provide the animals with leather shoes, that is pieces of ox-skin sewn around the hoofs. These leather shoes are known to [113] the Ahaggar Tuareg as *tissal* (sing. *tasselt*). Their appearance is excellently depicted by Lhote (Lhote 1951 b, photographs p. 224).

232 824 (5) Medical treatment which forms an important part of Tuareg veterinary knowledge. I have mentioned in the description of camel diseases the use of certain plants for the external treatment of scabies. The Tuareg also use various plants for drugs. Seeds of certain annual plants are mixed with milk and given to goats and sheep which suffer from stomach-diseases. Leaves of various plants are also considered laxatives. The Tuareg know many drugs made from wild plants, and they are aware that there are several wild plants that are dangerous to domestic animals. A very dangerous venomous plant is *élel* (*Nerium oleander*) which is extremely common in the higher parts of Ahaggar. It contains a kind of strychnine, and camels which eat *Nerium* leaves will die from this poison. The Tuareg say that camels bred and born in Ahaggar know the plant to be dangerous. These camels do not eat the *Nerium* leaves but others introduced to Ahaggar from the south may do so. To prevent camels from eating *Nerium* leaves the Tuareg put a leaf of the plant into their nostrils, or burn *Nerium* leaves so that the smoke and the scent of the plant enter the animal's nostrils. In this way camels come to loathe it. There are, according to Foucauld, other venomous plants in Ahaggar, e.g. *awrhed* (*Perralderia coronopifolia*), *arenked* (*Leptadenia heterophylla*, and/or *Cocculus pendulus*) which are fatal to goats and sheep (cf. Foucauld 1951–52, III, p. 1524 & IV, p. 1647; Maire 1933, p. 230, 236). The species [682] known to the Ahaggar Tuareg as *éfelehleh* (*Hyoscyamus muticus* ssp. *falezlez*) is very venomous for human beings, and in the past was used by the Tuareg to poison their enemies.

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human beings, and in the past was used by the Tuareg to poision their enemies. However, this plant does not seem to be venomous for domestic animals which grow fat from eating it (cf. Maire 1933, p. 192). One plant (*téhereggelé*) (*Artemisia judaïca*) is said to have an intermediate position: When camels eat its green shoots they may contract entrail diseases, but the plant is also considered a remedy for entrail worms. Domestic animals which have eaten venomous plants are generally treated with liquid butter which is poured into their mouths. Venomous animals are also very dangerous for domestic animals, notably scorpions and snakes which abound everywhere. The treatment of swollen limbs caused by snake bites or scorpion stings is sometimes bleeding, but the Northern Tuareg also consider it effective to give the affected animal fat from a female barbary sheep and to place a little fat over the place where the animal has been bitten or stung. Under this heading of veterinary medicine mention must finally be made of the fact that tobacco is considered to possess curative qualities in the case of certain diseases. When camels get tired and slow owing to congestion during the hot summer season the Tuareg consider it an excellent remedy to put, as mentioned above, powdered tobacco leaves in the animals' eyes. This was frequently practised with my own camels, and it seems to me that the method is efficacious.

It is evident that many veterinary methods among those mentioned above are effective, and I believe that Tuareg veterinary methods are largely to be considered rational. It is a true that it is most difficult for an anthropologist without any veterinary training to judge objectively the value of all treatments of stock-diseases. But French veterinary surgeons I consulted at Agadez held the view that the Tuareg methods they knew of were effective, though in specific cases of disease they could do better than the Tuareg, and one veterinary surgeon admitted that the Tuareg knew far more about camel-diseases than did modern veterinaries. It can be added that the Tuareg possess an anatomical knowledge of their animals which is no less than astonishing. Apoggi has noted 43 terms used by the Tuareg of Tasilé-n-Ajjer to describe the exterior parts of a camel (Apoggi 1933), and this list is not complete. It goes without saying that the Tuareg also have a large vocabulary for internal organs which they know in detail from slaughtering. And I believe they have a fairly good knowledge of physiology.

I have elsewhere given some information of Tuareg medical methods applied to human beings (Nicolaisen 1961; cf. also Humann 1933), and I have stated that Tuareg medicine cannot be understood entirely without reference to religious and magic beliefs. This is to some extent also true of their veterinary methods. But as far as I know there are many medical methods based on magic and religious ideas which are applied solely to human beings. This may seem quite natural.

Domestic animals may run the risk of being attacked by evil forces such as the evil eye and the evil mouth (*tehot* in Ahaggar; *tugarchet* in Ayr), the *Kel Asuf* spirits, and the mystic power known as *eššama* or *tezma* in Ayr (cf. p. 21), and valuable animals may carry Islamic amulets as a protection against these evils. I have seen such amulets carried by a few rams and he-goats, but they are used particularly for camels, and I believe that most camel amulets are meant to protect the animals from the evil eye (the evil mouth). Against this malignant force camels may also be provided with a donkey's hoof hung around the neck as an amulet. Another non-Islamic amulette is used for riding camels in Ayr:— Some Tuareg of this region hang the foot of a turtle around the camel's neck in order that their riding animal may not stumble.

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Fig. 95. A Tuareg feeding his riding camel with *afezu* grass (*Panicum turgidum*). Many Tuareg feed their riding animals with stems of this perennial grass – partly to obtain a docile camel for riding, partly to change its fodder which consists largely of acacias and annual plants. The photograph is taken near Agadez at the *akasa* season. Annual plants grow between trees and bushes (*afagag*, *Acacia Raddiana*; *ebezgin*, *Salvadora persica*; *tadent*, *Boscia senegalensis*). Ayr, the *Isakaraman* tribe.

than those mentioned. Thus they can use any kind of receptacle for milk and milking, and they do not clean their milk-bowls with urine as is normal among certain East African stock-breeders, and, perhaps, also among certain of the Fulani living south of Ayr. The taste of urine is detested by the Tuareg, who know this taste all too well as the water drawn from pools and wells is frequently flavoured with urine and the excrement of domestic animals. Nor is camel urine used by Tuareg women for hairdressing as is done among the Arabs, but it is said that it may have a medical value in curing wounds. The custom of drinking blood has been mentioned above (p. 122 f.) and will be described later (p. 235).

The Tuareg apparently have comparatively few superstitious usages in stock-breeding, which is mainly to be considered rational. We have seen that stock-breeding is adapted to environment, and we have also mentioned that there are veterinary methods which doubtless have their origin in considerable knowledge of the anatomy and physiology of domestic animals. This knowledge forms one corner-stone of rational stock-breeding, and another is the very detailed knowledge of botany. In Ahaggar there are more than 600 different plant species for which the Tuareg have particular names, though a few related species are sometimes known by one and the same name. Every Tuareg know about the ecological conditions of these plants, and he knows exactly their fodder value for domestic animals. He knows that certain plants form excellent fodder for all domestic animals, but he is also well aware that the different types of stock have different needs, so that certain plant species are valuable for camels, other species for other domestic animals.

The Tuareg are occasionally cruel to donkeys, and to dogs, but they take the greatest care of all other domestic animals to ensure their wellbeing and reproduction. Women bring acacia pods or tender annual plants to kids, lambs, and calves, and to sick animals which remain in the camp. On long trading expeditions, when the camels have little time for grazing, some Tuareg will walk along